

bridging pages 4 and 5 of the specification, in order to achieve increased selectivity of polishing, the quantity of polyelectrolytes in the abrasive composition is in excess of the amount which absorbs on the surface of the abrasive particles and therefore is present in some extent in the composition as free or unabsorbed polyelectrolytes. It is believed that the portion of the polyelectrolyte in the supernatant portion of the slurry controls the polishing rate selectivity.

Allman does not render obvious the present invention since, among other things, Allman does not suggest that a polyelectrolyte can be used to control the polishing rate selectivity. More particularly, claim 13 and claims dependent thereon recite employing an anionic polyelectrolyte for increasing the polishing rate ratio of silicon dioxide to silicon nitride and claim 18 recites entering a cationic polyelectrolyte for increasing the polishing ratio of metal to silicon dioxide, silicon nitride and/or silicon oxynitride. On the other hand, Allman relates to a polymer and an abrasive particle on a surface to be polished wherein the polymer is employed to form a temporary film to bind the abrasive. The particular polymer employed according to Allman is not critical (along these lines see column 5, see lines 13 and 14 thereof). In fact, the preferred polymer is a polyorganosiloxane.

In addition, after the composition is coated onto the substrate, the polymer is then cured by heating such as by a hot plate bake or furnace operation (see column 3, lines 31 and 32 and the Abstract). The coated substrate is then subsequently contacted with a polishing slurry to thereby dissolve or deplete the binder of the temporary film and to carry out the polishing. However, using, for instance, a polycarboxylate in place of the preferred polyorganosiloxane in Allman would seemingly not be operative. In particular, it seems likely that the polycarboxylate would form a cured film that would not readily dissolve. Along these lines, see Kirk-Othmer, Encyclopedia of Chemical Technology, Fourth Ed. Volume 7, page 954 which shows the very limited solubility of polycarboxylate coated zinc oxide particles.(copy enclosed) Likewise see the enclosed copy of US Patent 5,958,794. At most, following suggestions of Allman, but using a polycarboxylate would result in particles coming off in chunks tending to cause damage

to the wafers. Also, one should note that Allman fails to include any specific working examples.

Furthermore, Allman does not suggest that when polishing a silicon dioxide surface in contact with a silicon nitride surface that an anionic polyelectrolyte is to be employed. A person skilled in the art would not necessarily select an anionic polyelectrolyte from the numerous polymers suggested by Allman when polishing a silicon dioxide surface in contact with a silicon nitride surface and be lead to believe that the polishing ratio of the silicon dioxide to silicon nitride can be or would be increased.

Moreover, with respect to claim 18 and claims dependent thereon, Allman does not suggest cationic polyelectrolytes and nothing whatsoever in Allman suggests that employing a cationic electrolyte for polishing a metal surface would increase the polishing rate of the metal to silicon dioxide, silicon nitride and/or silicon oxynitride in contact therewith.

The mere fact that the cited art may be modified in the manner suggested by the Examiner does not make this modification obvious, unless the cited art suggest the desirability of the modification. No such suggestion appears in the cited art in this matter. The Examiner's attention is kindly directed to *In re Lee* 61 USPQ2d 1430 (Fed. Cir. 2002), *In re Dembiczak et al.* 50 USPQ2d. 1614 (Fed. Cir. 1999), *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984), *In re Laskowski*, 10 USPQ2d. 1397 (Fed. Cir. 1989) and *In re Fritch*, 23, USPQ2d. 1780 (Fed. Cir. 1992).

In *Dembiczak et al.*, supra, the Court at 1617 stated: "Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references. See, e.g., C.R. Bard, Inc., v. M3 Sys., Inc., 157 F.3d. 1340, 1352, 48 USPQ2d. 1225, 1232 (Fed. Cir. 1998) (describing 'teaching or suggestion motivation [to combine]' as in 'essential evidentiary component of an obviousness holding'), In re Rouffet, 149 F.3d 1350, 1359, 47 USPQ2d. 1453, 1459 (Fed. Cir. 1998) ('the Board must identify specifically...the reasons one of ordinary skill in the art would have been motivated to select the references and combine them');..."

Also, the cited art lacks the necessary direction or incentive to those of ordinary skill in the art to render under 35 USC 103 sustainable. The cited art fails to provide the degree of predictability of success of achieving the properties attainable by the present invention needed to sustain a rejection under 35 USC 103. See *Diversitech Corp. v. Century Steps, Inc.* 7 USPQ2d 1315 (Fed. Cir. 1988), *In re Mercier*, 187 USPQ 774 (CCPA 1975) and *In re Naylor*, 152 USPQ 106 (CCPA 1966).

Moreover, the properties of the subject matter and improvements which are inherent in the claimed subject matter and disclosed in the specification are to be considered when evaluating the question of obviousness under 35 USC 103. See *Gillette Co. v. S.C. Johnson & Son, Inc.*, 16 USPQ2d. 1923 (Fed. Cir. 1990), *In re Antonie*, 195, USPQ 6 (CCPA 1977), *In re Estes*, 164 USPQ (CCPA 1970), and *In re Papesch*, 137 USPQ 43 (CCPA 1963).

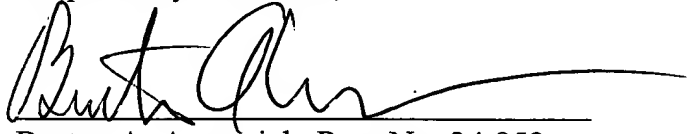
No property can be ignored in determining patentability and comparing the claimed invention to the cited art. Along these lines, see *In re Papesch*, supra, *In re Burt et al*, 148 USPQ 548 (CCPA 1966), *In re Ward*, 141 USPQ 227 (CCPA 1964), and *In re Cescon*, 177 USPQ 264 (CCPA 1973).

In view of the above, consideration and allowance are, therefore, respectfully solicited.

In the event the Examiner believes an interview might serve to advance the prosecution of this application in any way, the undersigned attorney is available at the telephone number noted below.

The Director is hereby authorized to charge any fees, or credit any overpayment, associated with this communication, including any extension fees, to CBLH Deposit Account No. 22-0185.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Burton A. Amernick', written over a horizontal line.

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# ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY

FOURTH EDITION

VOLUME 7

COMPOSITE MATERIALS  
TO  
DETERGENCY



A Wiley-Interscience Publication  
**JOHN WILEY & SONS**

New York • Chichester • Brisbane • Toronto • Singapore

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## 954 DENTAL MATERIALS

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specific use. The set cement, having a minimum amount of gel matrix and maximum amount of particles, has the best physical properties for use in the mouth.

Except for the little used silicate cements, which use calcium aluminofluorosilicate glasses in place of zinc oxide-magnesium oxide base powder, modifications of the zinc phosphate cement have been minimal (28). A novel modification of the zinc phosphate cement is the inclusion of phosphate-based organic polymers in the formulation. This improves both its strength and adhesion to dentin (29). The most important classes of new acid-base cements are those based on poly(alkenoic acids), ie, the polycarboxylate cements, the glass-ionomer cements, and the resin-modified glass-ionomer cements (see IONOMERS).

**Polycarboxylate Cements.** Polycarboxylate cements (30,31) are made by mixing a zinc oxide-based powder and an aqueous solution of poly(acrylic acid) [9003-01-4] or similar polyacid (see ACRYLIC ACID). The biological effects of these cements on soft and mineralized tissues are mild (32). The effect on the pulp is similar to that of the zinc eugenolate cements (33). This type of cement seems to have overall excellent biocompatibility (28). When freshly mixed, the carboxylic acid groups convert to carboxylates, which seems to signify chemical adhesion mainly via the calcium of the hydroxyapatite phase of tooth structure (32,34-39). The adhesion to dentin is reduced because there is less mineral available in this substrate, but bonding can be enhanced by the use of mineralizing solutions (35-38). Polycarboxylate cement also adheres to stainless steel and clean alloys based on multivalent metals, but not to dental porcelain, resin-based materials, or gold alloys (28,40). It has been shown that basic calcium phosphate powders, eg, tetracalcium phosphate [1306-01-0],  $\text{Ca}_4(\text{PO}_4)_2\text{O}$ , can be substituted for zinc oxide to form strong, hydrolytically stable cements from aqueous solution of polyacids (41,42).

The compressive strength of polycarboxylate cements at cementing consistency is 55-85 MPa (8,000-12,000 psi). Typical diametral tensile strength ranges from 8-12 MPa (1160-1740 psi). The solubility and disintegration in distilled water after 7 days at 37°C is 0.04-0.08 wt %, and is not reflected in clinical performance.

The powder contains zinc oxide and magnesium oxide (36), and the liquid contains an aqueous solution of an acrylic polycarboxylic acid. Water settable cements have been formulated by inclusion of the solid polyacid in the powdered base component. The set cement mainly consists of partially reacted and unreacted zinc oxides in an amorphous polycarboxylate matrix (27,28).

**Glass-Ionomer Cement.** The glass-ionomer polyelectrolyte system was developed primarily as a restorative for anterior teeth and erosion cavities; a general cement; a cavity liner; and a base, pit, and fissure sealant (27,43-48).

The glass-ionomer cement has some translucency in contrast to that of the opaque polycarboxylate cement. The setting time is approximately 2-4 minutes. Compressive strength in 24 h is 154-175 MPa, and diametral tensile strength is 7-19 MPa (1000-2700 psi). Solubility in distilled water after 7 days is ca 0.44%. Glass-ionomers used as restoratives are available in several tooth colored shades. They lack the strength necessary for stress-bearing restorations, but the fluoride from the aluminofluorosilicate glass is slowly released from the filling, possibly inhibiting recurrent caries (49).

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